

The Economic Benefits of Global Navigation Satellite System and its Commercial and Non-Commercial Applications

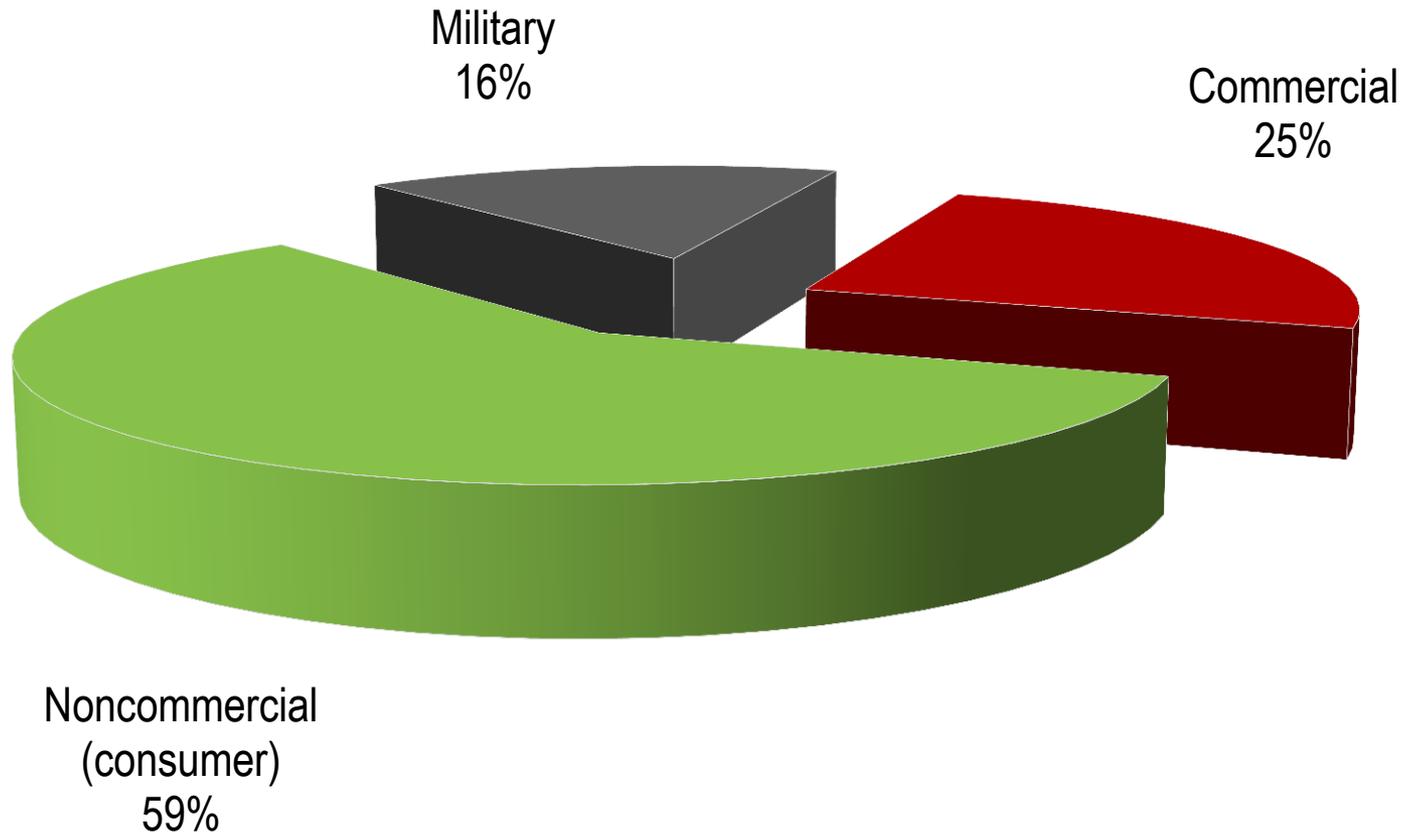
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Outline

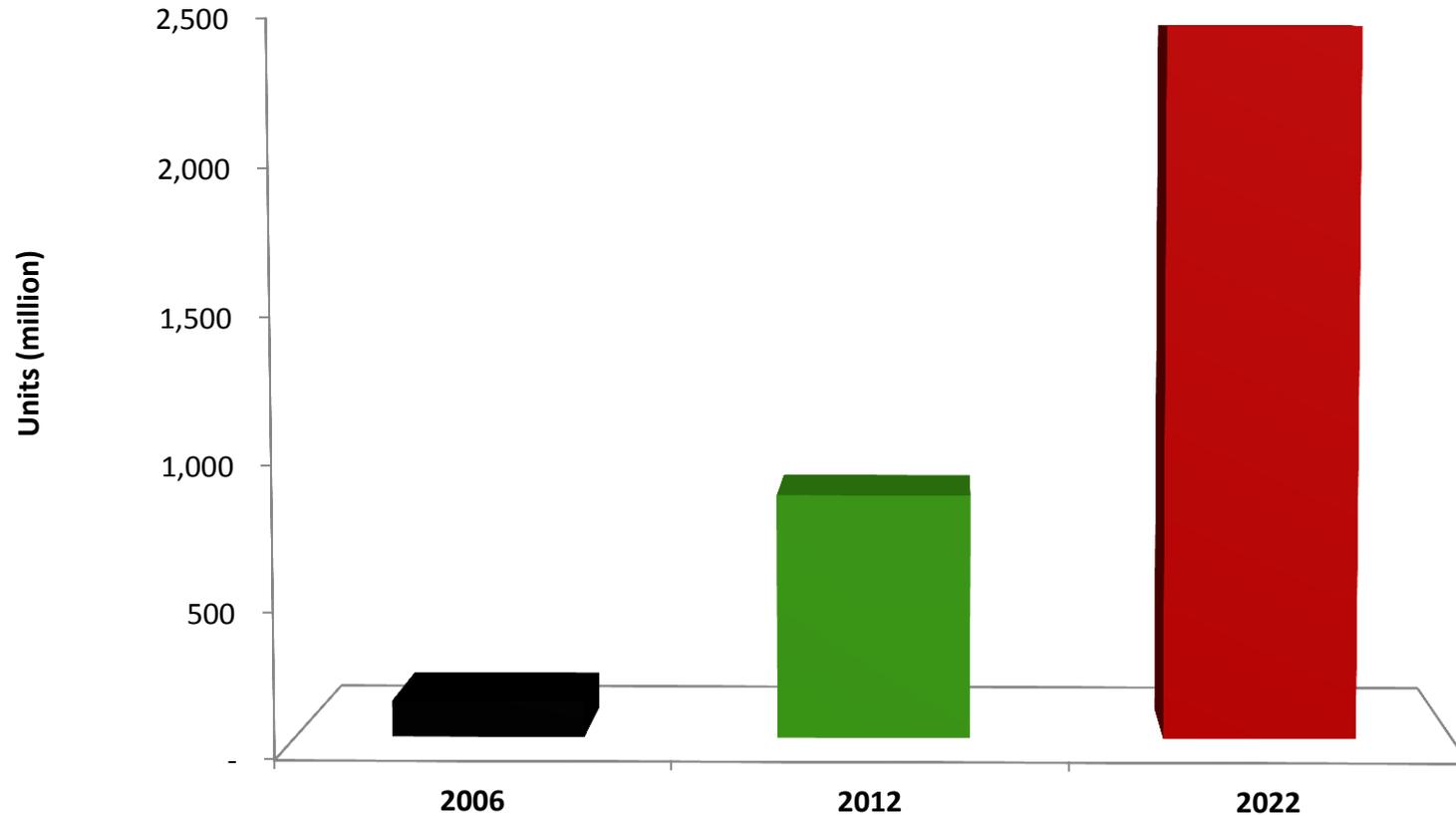
- **Global Industry Overview**
- **Contributions of GNSS Manufacturers**
- **Impacts of GNSS on Consumer Benefits**

Revenue shares of GPS equipment



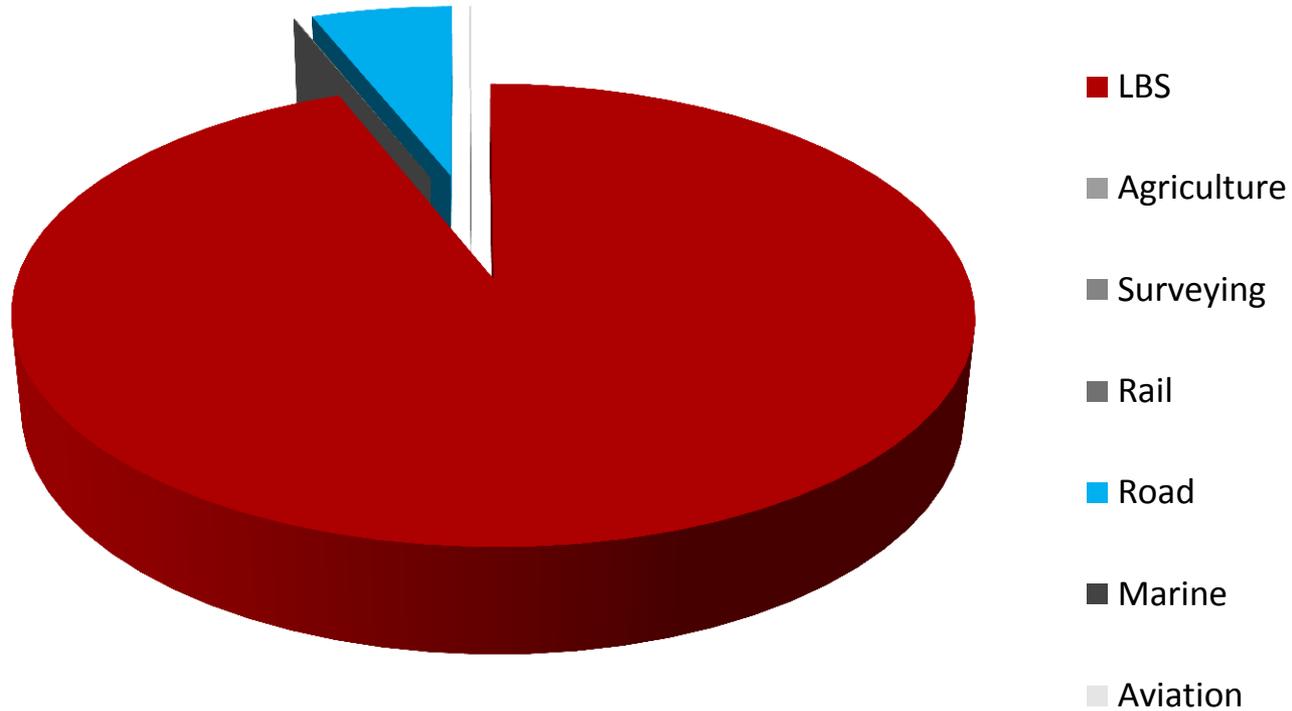
Source: ABI Research.

Annual shipments of GNSS devices



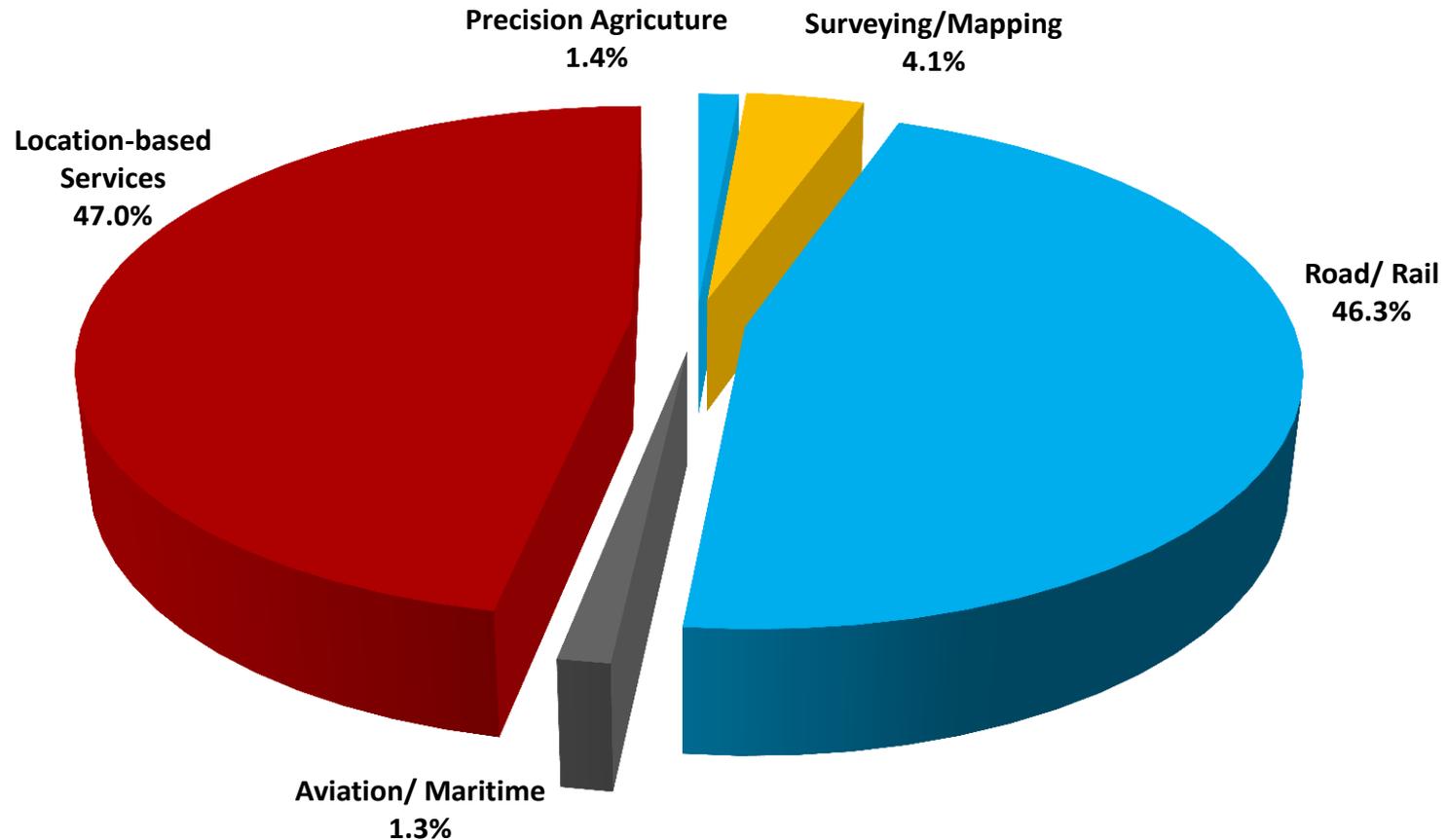
Source: The European GNSS Agency.

Location-based service market dominates



Source: The European GNSS Agency.

Cumulative GNSS revenues, 2012-2022



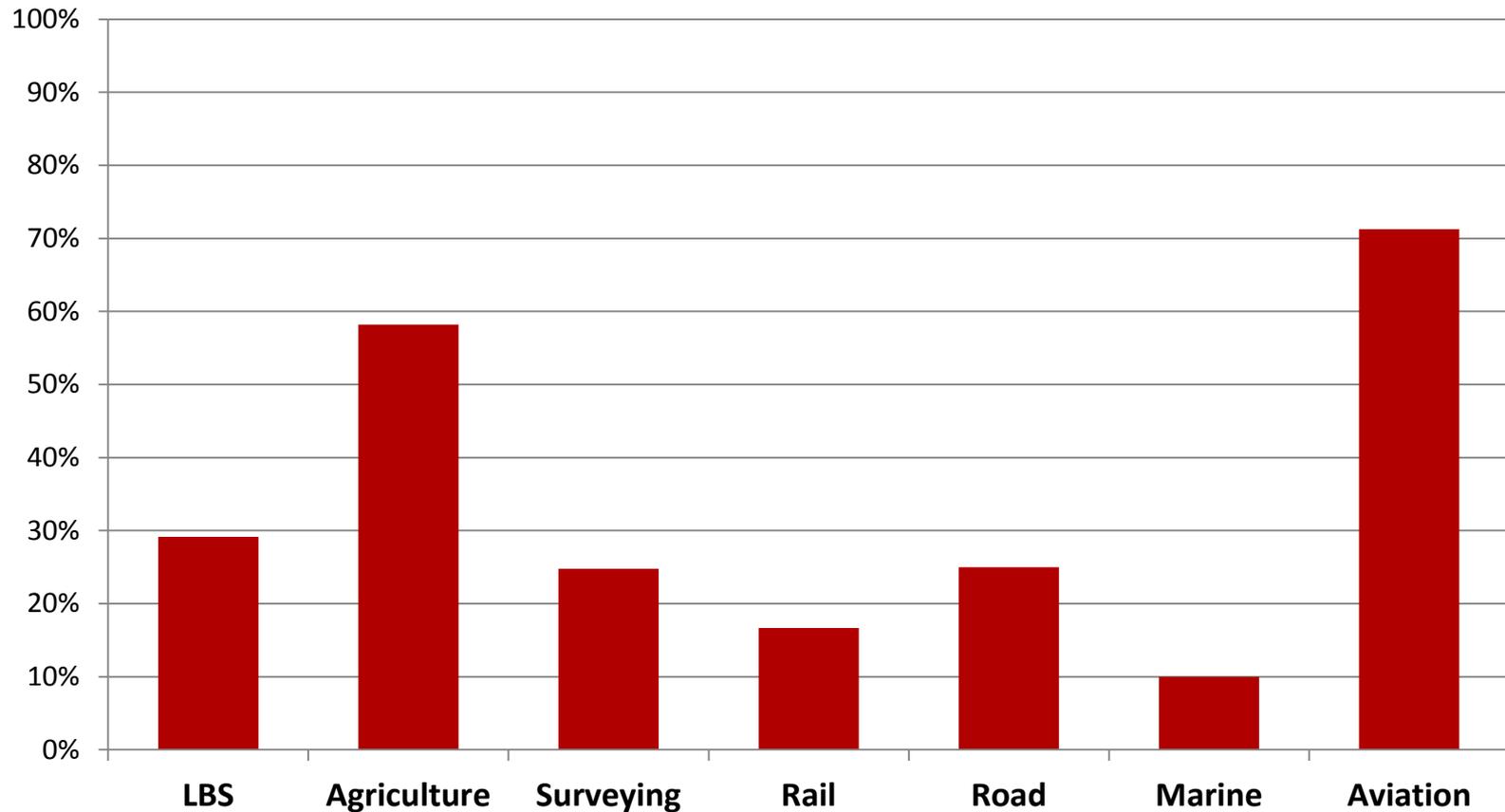
Source: The European GNSS Agency.

Global GNSS markets

Market Segment	Installed Base (units; million)		Shipments (units; million)		Revenues (\$; billion)	
	2012	2022	2012	2022	2012	2022
LBS	1,600.0	6,300.0	800.0	2,350.0	16.3	93.8
Agriculture	0.5	3.6	0.2	0.8	0.8	2.4
Survey	0.3	1.3	0.1	0.3	2.9	5.0
Rail	0.1	0.4	0.1	0.1	0.1	0.1
Road	200.0	500.0	50.0	120.0	38.0	41.0
Marine	0.5	1.0	0.1	0.2	0.2	0.4
Aviation	0.8	1.5	0.3	0.4	1.1	1.2
Total	1,802.2	6,870.8	850.8	2,471.8	59.4	143.9

Source: The European GNSS Agency; author's estimates.

Revenue shares in North America, 2012



Source: The European GNSS Agency.

GNSS-related manufacturing industries in the U.S., 2011

	NAICS 334220	NAICS 334511	NAICS 334519
Number of Establishments	809	592	805
Employees	68,643	145,288	28,033
Annual Payrolls (\$ million)	6,192.3	12,186.8	2,013.3
Value of Shipments (\$ million)	30,231.6	52,145.8	9,533.9
Value Added (\$ million)	13,708.0	34,683.0	5,892.2
<u>Per employee</u>			
Annual Payroll (\$)	90,210	83,880	71,818
Total of Shipments (\$)	440,418	358,913	340,096
Value Added (\$)	199,700	238,719	210,187

Source: U.S. Census Bureau Annual Survey of Manufacturers.

Contributions of GNSS manufacturers to the U.S. economy

Economic Benefits	Total
<u>Direct Economic Impacts</u>	
Total Revenues	\$16.0 billion
Total Value Added	\$9.1 billion
Total Payrolls	\$3.5 billion
Number of Employees	42,126
Payroll per Employee	\$81,969
<u>Direct and Indirect Economic Impacts</u>	
Output	\$32.0 billion
Earnings	\$6.8 billion
Employment	105,315

Source: U.S. Bureau of Economic Analysis; U.S. Census Bureau; author's estimates.

Examples of GNSS manufacturers and downstream companies of the value chain

Value Chain	Examples of Key Companies
Chipset manufacturers	<ul style="list-style-type: none">Broadcom, Intel, Qualcomm, Texas Instruments
Device Manufacturers	<ul style="list-style-type: none">Honeywell, Rockwell Collins, Universal, Garmin, Trimble
Device Vendors	<ul style="list-style-type: none">Apple, Dell, HP, Garmin, Trimble, TomTom, John Deere,
Service & Content Providers	<ul style="list-style-type: none">Apple, Garmin, Google, Nokia, TomTom
Original Equipment Manufacturers	<ul style="list-style-type: none">Ford, General Motors, Daimler
Application Developers	<ul style="list-style-type: none">Apple, Microsoft, TripAdvisor
Application Stores	<ul style="list-style-type: none">Apple App Store, Amazon App Store, Google Play, Windows Phone Store

Source: The European GNSS Agency.

Growing location-based service market

➤ Growing markets globally

- From 100 million units sold in 2006 to 800 million units in 2012
- More than half of mobile phones in the U.S. have GNSS capability
- Rapid innovation and applications in other devices (tablets and cameras)

➤ Commercial and noncommercial benefits

- Governments: disaster response, people tracking
- Companies: core business operations, sales, marketing
- Consumers: time savings, fuel savings, emergency response, education

➤ Future

- Annual unit sales triple by 2022 to over 2.3 billion units
- Installed base of GNSS devices to more than 6 billion units by 2022

Growing aviation market

➤ Growing aviation users

- From 43,000 flights a day in 2010 to 60,000 flights a day in 2030 (FAA)
- From 712 million passengers in 2010 to 1.2 billion passengers in 2030 (FAA)

➤ NextGen

- Cost savings -- reduce fuel, reduce congestion, reduce delay, reduce carbon dioxide emissions
- Improve efficiency – enhance safety, increase accuracy and integrity of flights

Growing ground transportation market

➤ **Growing ground transportation users**

- 82% of U.S. population live and work in urban areas

➤ **Intelligent technology systems (ITS)**

- Cost-effective solutions to maximize the existing infrastructure to reduce congestion and enhance mobility
- GAO reports that benefits are larger than costs (GAO)
- Benefit-to-cost ratio of real-time traffic and information system is 25 (DOT)

Other market segments

- **Precision agriculture**
- **Engineering construction**
- **Surveying/Mapping**

Economic benefits of major market segments

Markets	Economic Benefits
Location-based Services	\$1.6 trillion in economic activities \$1.4 trillion in cost savings
Aviation -- NextGen	\$123 billion cumulative money saved through 2030
Ground Transportation – ITS	\$30.2 billion cumulative cost savings through 2018
Precision Agriculture	\$19.9 ~ \$33.2 billion per year
Engineering Construction/Survey	\$9.2 ~ \$23 billion per year

Thank you

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